NON-PUBLIC?: N
ACCESSION #: 9101220420
LICENSEE EVENT REPORT (LER)

FACILITY NAME: VOGTLE ELECTRIC GENERATING PLANT - PAGE: 1 OF 4
UNIT 1

DOCKET NUMBER: 05000424

TITLE: TRANSFORMER FAILURE RESULTS IN LOSS OF STEAM GENERATOR LEVEL AND
MANUAL REACTOR TRIP
EVENT DATE: 12/18/90 LER #: 90-023-00 REPORT DATE: 01/15/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: R. M. ODOM, NUCLEAR SAFETY AND TELEPHONE: (404) 826-3201
COMPLIANCE

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: EA COMPONENT: XFMR MANUFACTURER: G080
X EA BKR B455
REPORTABLE NPRDS: Y
Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 12-18-90 at 1936 CST, Unit 1 was operating at 100% power when a 4160/480 volt non-1E transformer (1NB10X) experienced an internal fault. This failure resulted in a loss of power for the speed control circuitry for the 1B Main Feedwater Pump (MFP) turbine and certain support systems for emergency diesel generator 1B. Feedwater pump speed, feedwater flow, and Steam Generator (SG) levels decreased. The Reactor Operator initiated a manual reactor trip at 1937 CST after efforts to maintain SG levels were unsuccessful. All safety related functions occurred per design following the reactor trip; however, a non-1E 4160 volt bus failed to automatically transfer to the reserve auxiliary transformers

causing a temporary loss of various non-1E house loads. Transfer of the 4160 volt bus was completed manually and normal plant conditions were established for Hot Standby by 1956 CST.

The root cause for the transformer failure is indeterminate; however, several similar transformer failures have occurred at VEGP (reference LER 50-424/1990-016). The involved transformers are GE Class AA/FA, three phase, dry type transformers. The failed transformer has been replaced and further study of possible factors which may have led to the failure is in progress.

END OF ABSTRACT

A. REQUIREMENT FOR REPORT

This report is required per 10 CFR 50.73 (a)(2)(iv) because an unplanned actuation of the Reactor Protection System (RPS) occurred.

B. UNIT STATUS AT TIME OF EVENT

At the time of this event, Unit 1 was in Mode 1 (Power Operation) at 100% of rated thermal power. Other than that described herein, there was no inoperable equipment which contributed to the occurrence of this event.

C. DESCRIPTION OF EVENT

On 12-18-90, at 1936 CST, a 4160/480 volt non-1E transformer (1NB10X) experienced an internal fault, causing the associated feeder breaker to trip open. This resulted in a loss of power to 480 volt switchgear 1NB10 which was supplying power for the speed control circuitry for the 1B Main Feedwater Pump (MFP) turbine and for the keep warm lube oil pumps and air compressors for emergency diesel generator 1B. On receipt of alarms in the control room for the loss of 1NB10, control room operators quickly recognized that the speed of MFP 1B and feedwater flow was decreasing and that Steam Generator (SG) water levels were beginning to decrease. In an attempt to maintain SG levels, the Balance of Plant Operator immediately started the standby condensate pump and began to decrease turbine load. Also, the Reactor Operator began to manually insert control rods and initiated emergency boration. At 1937 CST, with SG levels at 20% narrow range and decreasing, a manual reactor trip was initiated prior to reaching the SG low-low level trip setpoint.

On initiation of the reactor trip, all control rods were observed to fully insert and a Feedwater Isolation (FWI) and an Auxiliary Feedwater (AFW) actuation occurred per design. All additional safety related functions occurred per design; however, following the trip of the main generator on the reactor trip, a non-1E 4160 volt bus (1NA04) failed to automatically transfer from the Unit Auxiliary Transformers (UATs) to the Reserve Auxiliary Transformers (RATs). This resulted in a temporary loss of power to the non-1E house loads that were being supplied by 1NA04. Also, on the failure of 1NA04 to transfer, certain non-1E inverters tied to the Technical Support Center (TSC) batteries failed to pick up the power supply for the Unit 1 and Unit 2 Emergency Response Facility (ERF) computers, certain multiplier cabinets, and the plant paging system. This resulted in a temporary loss of these components and temporarily affected several inputs to the plant computer, Proteus. At 1950 CST, 1NA04 was successfully transferred to the RATs after a Plant Equipment Operator (PEO) manually racked out and racked in the RAT tie breaker. The various loads supplied by 1NA04 were restored and at 1956 CST, Unit Operating Procedure (UOP)

12006-C, "Unit Cooldown to Cold Shutdown," was entered after normal plant conditions were established for Mode 3 (Hot Standby). Subsequently, at 2022 CST, the operability of the required AC offsite sources was verified in accordance with the requirements of the Technical Specifications for an inoperable emergency diesel generator.

D. CAUSE OF EVENT

The direct cause of the reactor trip was the loss of power to 480 volt switchgear 1NB10 due to the failure of transformer 1NB10X. The root cause for the failure of 1NB10X is indeterminate. Investigation of the failure indicates that the transformer experienced an internal fault in the "B" phase high side windings; however, the initiating cause for the fault has not been determined. Transformer 1NB10X is a GE Class AA/FA, three phase, 60 hertz, dry type transformer. Several similar past failures of this type transformer (reference LER 50-424/1990-016 dated 8-21-90) have occurred at VEGP. In each of these failures, the fault occurred in the "B" phase high side windings, in the upper part of the "B" phase core. Due to the previous similar failures, corrective action was taken to install a surge arrestor for this transformer. Installation of the surge arrestor did not prevent the failure of 1NB10X; however, it is possible that the transformer had been fatigued prior to the

installation of the surge arrestor. Further study is in progress to assess whether premature "aging" of the transformer may have occurred and, if so, what possible factors may have contributed to the premature aging.

The cause for the failure of 1NA04 to automatically transfer to the RAT's was determined to be a failure of the RAT tie breaker to close. The as found gap between the breaker control relay device and the breaker limit switch crank was out of specified tolerance.

The cause for the failure of the inverters to pick up the power supply for the ERF computer, and associated components, was determined to be that the battery supply breaker for the inverters had been left open. Investigation determined that a Georgia Power Company electrician had failed to ensure the breaker was closed after performing a battery service discharge test on 11-28-90. No sign-off is provided in procedure 27915-C, "General Battery Maintenance," for closing the breaker and this apparently contributed to the occurrence of the personnel error.

E. ANALYSIS OF EVENT

Following the failure of transformer 1NB10X, the control room operators responded appropriately to initiate a manual reactor trip, thus precluding a challenge to the automatic protection system. Also, following the reactor trip, a FWI, an AFW actuation, and other required safety functions occurred per design to maintain safe plant conditions. During the time that the operability of emergency diesel generator 1B was affected, the operability of the required AC offsite sources and the operability of the redundant

diesel generator was demonstrated in accordance with requirements of the Technical Specifications. Based on these considerations, there was no adverse effect on plant safety or on the health and safety of the public as a result of this event.

F. CORRECTIVE ACTIONS

1. Installation of a replacement transformer for 1NB10X was completed on 12-20-90 and emergency diesel generator 1B was restored to operable status. The replacement transformer has a Basic Lightning-Impulse Insulation Level (BIL) rating of 30 while the transformer which failed had a BIL rating of 25.

2. A review will be completed by 4-1-91 to identify additional "critical" transformers and determine the feasibility of replacing them with transformers having a higher BIL rating.

3. A replacement breaker was installed for the 1NA04 RAT tie breaker which failed to close following the reactor trip. The breaker which was removed from the 1NA04 RAT tie breaker cubicle was rebuilt and placed in storage as a spare.

4. The battery breaker for the inverters which failed during the event was closed after it was found open. A procedure revision is being developed for performance of the battery service discharge test which will include a sign-off for ensuring the battery breaker is closed after test completion. The procedure revision is expected to be issued by 2-15-91.

G. ADDITIONAL INFORMATION

1. Failed Components Identification:

Transformer 1NB10X - 4160/480 Volt, General Electric Class AA/FA
Three Phase, 60 Hertz, 1000/1333 KVA Rating
Dry Type Transformer

RAT Tie Breaker 1NA04 - Brown Boveri 5 kV
Model No. 5HK350-3000

2. Previous Similar Events:

LER 50-424/1990-016 described a Unit 1 reactor trip which resulted from a failure of a 4160/480 Volt GE Dry Type Transformer (1NB01X).

3. Energy Industry Identification System Codes:

Medium - Voltage Power System (601 V to 35 kV) - EA
Low - Voltage Power System (600 V and less) - EC

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January 15, 1991
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Senior Vice President
Nuclear Operations
ELV-02435
0798

Docket Nos. 50-424

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT
LICENSEE EVENT REPORT
TRANSFORMER FAILURE RESULTS IN LOSS OF STEAM
GENERATOR LEVEL AND MANUAL REACTOR TRIP

In accordance with 10 CFR 50.73, Georgia Power Company hereby submits the enclosed report related to an event which occurred on December 18, 1990.

Sincerely,

W. G. Hairston, III

WGH,III/NJS/gm

Enclosure: LER 50-424/1990-023

xc: Georgia Power Company
Mr. C. K. McCoy
Mr. W. B. Shipman
Mr. P. D. Rushton
Mr. R. M. Odom
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U. S. Nuclear Regulatory Commission

Mr. S. D. Ebneter, Regional Administrator
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